Avoiding Common Errors

Exercises 20–35 Students may forget to take into account coefficients, negative signs, and exponents when working these exercises. Refer these students to Examples 5–7 to demonstrate how to solve exercises involving these concepts.

Teaching Strategy

Exercise 46 After students have shown an algebraic representation that ${}_nC_r = {}_nC_{n-r}$, demonstrate how Pascal's triangle also models the equivalency. For example, ${}_7C_3 = {}_7C_4$ and ${}_{10}C_7 = {}_{10}C_3$.

52a. $\frac{15!}{5! \cdot 7! \cdot 3!}$; 360,360 assignments

52b. $\frac{15!}{10! \cdot 5!} \cdot \frac{10!}{3! \cdot 7!} \cdot \frac{3!}{0! \cdot 3!}$; 360,360 assignments

52c. They are the same. *Sample answer:* They are two different ways of counting the same situation. The additional factorials in the numerators and denominators of the expression in part (b) simplify to become the numerator and denominator of the expression in part (a).

PROBLEM SOLVING

EXAMPLES A 1, 2, and 3 on pp. 690–691 for Exs. 48–50

48. MUSIC You want to purchase 3 CDs from an online collection that contains the types of music shown at the right. You want each CD to contain a different type of music such that 2 CDs are different types of contemporary music and 1 CD is a type of classical music. How many different sets of music types can you choose? **30 sets**

@HomeTutor for problem solving help at classzone.com

49. FLOWERS You are buying a bouquet. The florist has 18 types of flowers that you can use to make the bouquet. You want to use *exactly* 3 types of flowers. How many different combinations of flower types can you use in your bouquet? **816 combinations**

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50. ARCADE GAMES An arcade has 20 different arcade games. You want to play at least 14 of them. How many different combinations of arcade games can you play? **38,760 combinations**

B

51. MULTI-STEP PROBLEM A televised singing competition picks a winner from 20 original contestants over the course of five episodes. During each of the first, second, and third episodes, 5 singers are eliminated by the end of the episode. The fourth episode eliminates 2 more singers, and the winner is selected at the end of the fifth episode.

a. How many combinations of 5 singers out of the original 20 can be eliminated during the first episode? **15,504 combinations**

b. How many combinations of 5 singers out of the 15 singers who started the second episode can be eliminated during the second episode? **3,003 combinations**

c. How many combinations of singers can be eliminated during the third episode? during the fourth episode? during the fifth episode? **252 combinations; 10 combinations; 3 combinations**

d. Find the total number of ways in which the 20 original contestants can be eliminated to produce a winner. **18,772 combinations**

52. ★ EXTENDED RESPONSE A group of 15 high school students is volunteering at a local fire station. Of these students, 5 will be assigned to wash fire trucks, 7 will be assigned to repaint the station's interior, and 3 will be assigned to do maintenance on the station's exterior. **a–c. See margin.**

a. Calculate One way to count the number of possible job assignments is to find the number of permutations of 5 *W*'s (for "wash"), 7 *R*'s (for "repainting"), and 3 *M*'s (for "maintenance"). Use this method to write the number of possible job assignments first as an expression involving factorials and then as a number.

b. Calculate Another way to count the number of possible job assignments is to first choose the 5 *W*'s, then choose the 7 *R*'s, and then choose the 3 *M*'s. Use this method to write the number of possible job assignments first as an expression involving factorials and then as a number.

c. Analyze *Compare* your results from parts (a) and (b). *Explain* why they make sense.

Volunteers in Aniak, Alaska

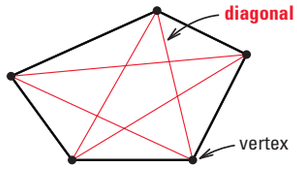
◯ = WORKED-OUT SOLUTIONS on p. WS1

★ = STANDARDIZED TEST PRACTICE

696

C

53. CHALLENGE A polygon is *convex* if no line that contains a side of the polygon contains a point in the interior of the polygon. Consider a convex polygon with n sides.



a. Use the combinations formula to write an expression for the number of line segments that join pairs of vertices on an n-sided polygon. ${}_nC_{n-2}$

b. Use your result from part (a) to write a formula for the number of diagonals of an n-sided convex polygon. $\frac{n(n-3)}{2}$

MIXED REVIEW

PREVIEW
Prepare for Lesson 10.3 in Exs. 54–57.

Find the area of the figure. *(pp. 991–992)*

54. Circle with radius 16 inches **about 804 in.^{2}**

55. Rectangle with sides 8.25 feet and 12.1 feet **99.825 ft^2**

56. Triangle with base 15 centimeters and height 18 centimeters **135 cm^2**

57. Trapezoid with bases 12 meters and 16 meters, and height 9 meters **126 m^2**

Solve the equation.

58. $8\sqrt{4x} - 5 = 19$ *(p. 452)* **2.25**

59. $(x-2)^{3/2} = 216$ *(p. 452)* **38**

60. $\ln(x+4) = \ln 5$ *(p. 515)* **1**

61. $10^{4x} - 5 = 11$ *(p. 515)* **about 0.3**

62. $\frac{x}{x-2} = \frac{x+3}{x+1}$ *(p. 589)* **no solution**

63. $\frac{1}{x-3} + 3 = \frac{2x}{x+3}$ *(p. 589)* $\frac{-7 \pm \sqrt{145}}{2}$

Write an equation of the perpendicular bisector of the line segment joining the two points. *(p. 614)*

64. $(-4, -2), (6, 2)$ $y = -\frac{5}{2}x + \frac{5}{2}$

65. $(9, -2), (3, 6)$ $y = \frac{3}{4}x - \frac{5}{2}$

66. $(-8, -13), (7, 10)$ $y = -\frac{15}{23} - \frac{42}{23}$

67. $(6, 9.3), (0, 8.2)$ $y = -\frac{60}{11}x + \frac{1105}{44}$

QUIZ *for Lessons 10.1–10.2*

For the given license plate configuration, find how many plates are possible if letters and digits (a) can be repeated and (b) cannot be repeated. *(p. 682)*

1. 2 letters followed by 3 digits
1a. 676,000 license plates
1b. 468,000 license plates

2. 3 digits followed by 3 letters
2a. 17,576,000 license plates
2b. 11,232,000 license plates

Find the number of distinguishable permutations of the letters in the word. *(p. 682)*

3. AWAY **12**

4. IDAHO **120**

5. LETTER **180**

6. TENNESSEE **3780**

Find the number of combinations. *(p. 690)*

7. ${}_8C_6$ **28**

8. ${}_7C_4$ **35**

9. ${}_9C_0$ **1**

10. ${}_{12}C_{11}$ **12**

Use the binomial theorem to write the binomial expansion. *(p. 690)* **11–14. See margin.**

11. $(x+5)^5$

12. $(2s-3)^6$

13. $(3u+v)^4$

14. $(2x^3 - 3y)^5$

15. Find the coefficient of x^3 in the expansion of $(x+2)^9$. *(p. 690)* **5376**

16. MENU CHOICES A pizza parlor runs a special where you can buy a large pizza with 1 cheese, 1 vegetable, and 2 meats for $12. You have a choice of 5 cheeses, 10 vegetables, and 6 meats. How many different variations of the pizza special are possible? *(p. 682)* **750 variations**

5 ASSESS AND RETEACH

Daily Homework Quiz

Transparency Available

1. Find ${}_9C_5$. **126**

2. The manager of a chain of restaurants must choose 6 restaurants from 11 for a promotion. How many different selections can be made? **462 selections**

3. A committee consists of 10 Republicans and 8 Democrats. In how many ways can a subcommittee be chosen if it has 5 Republicans and 4 Democrats? **17,640 ways**

4. Use the binomial theorem to expand $(3 - x^2)^3$. **$27 - 27x^2 + 9x^4 - x^6$**

5. What is the coefficient of x^2y^3 in $(x - 5y)^5$? **-1250**

Online Quiz
Available at **classzone.com**

Diagnosis/Remediation

- Practice A, B, C in Chapter 10 Resource Book, pp. 18–20
- Study Guide in Chapter 10 Resource Book, pp. 21–22
- Practice Workbook, pp. 151–152
- @HomeTutor

Challenge

Additional challenge is available in the Chapter 10 Resource Book, p. 25.

Quiz

An easily-readable reduced copy of the quiz (with answers) on Lessons 10.1–10.2 from the Assessment Book can be found on p. 680E.

11. $x^5 + 25x^4 + 250x^3 + 1250x^2 + 3125x + 3125$

12. $64s^6 - 576s^5 + 2160s^4 - 4320s^3 + 4860s^2 - 2916s + 729$

13. $81u^4 + 108u^3v + 54u^2v^2 + 12uv^3 + v^4$

14. $32x^{15} - 240x^{12}y + 720x^9y^2 - 1080x^6y^3 + 810x^3y^4 - 243y^5$